

CLAIMS

I claim:

1. An electro-chemical sensor comprising: /

5 a plurality of chambers, each filled with an electrolyte;
a plurality of electrodes, one said electrode inserted into each said
chamber, thereby forming a plurality of electrochemical half-cells;
at least two liquid junction salt bridges, said bridges separating said
chambers from each other and from the sample to be measured;
an ion-specific detection means;
10 at least one housing over all the above elements;
means for measuring and quantifying the electronic potential of each
set of two said half-cells; and,
means to convert said potential measurements into a visual display.

- 15 2. A sensor as in Claim 1, wherein one said electrochemical half-cell is a
designated reference cell, said cell being physically isolated from said
sample to be measured, and with voltage potential ideally independent
of the concentration of measured ion.

3. A sensor as in Claim 1, further comprising at least 3 electrochemical
cells.

- 20 4. A sensor as in Claim 1, wherein one said electrochemical cell is a
designated diagnostic half-cell, said cell being connected through at
least one salt bridge to the measurement sample.

- 25 5. A sensor as in Claim 1, wherein one said electrochemical cell is a
designated diagnostic half-cell, said cell being in indirect contact with
the measurement sample via one or more intervening liquid junctions.

6. A sensor as in Claim 1, wherein one said electrochemical half-cell is
designed to measure chemical changes in the diagnostic half-cell cell.

7. A sensor as in Claim 1, further comprising a plurality of housings, preferably one wholly inside another.

8. A sensor as in Claim 7, wherein the exterior housing is comprised of a conductive material, preferably of metal, and thereby suitable for a solution ground for said potential measurements.

9. A sensor as in Claim 1, wherein one said electrochemical half-cell is used as a solution ground.

10. A sensor as in Claim 1, wherein said exterior housing is comprised of a non-conductive material.

11. A sensor as in Claim 1, wherein one said electrochemical half-cell is located external to said shell.

12. A sensor as in Claim 1, wherein the voltage potential change between two said half-cells is converted to a measured change in chemical gradient.

13. The measurement of ion concentration of a sample using the sensor of Claim 1.

14. The measurement of diagnostic half-cell degradation within the sensor of Claim 1.

15. The use of the sensor of Claim 1 to aid in the calibration of the ion measurement.

16. The use of the sensor of Claim 1 in an automated mode for replacement of sensors when degradation limits are reached.

17. The use of the sensor of Claim 1 in an alert mode for the alerting of operators to changes in cell potential.